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NEW SPECIES OF OXYBELUS FROM WESTERN NORTH AMERICA

(Hymenoptera: Sphecidae)

RICHARD M. BOHART AND EVERT I. SCHLINGER

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In connection with a survey of the genus *Oxybelus* in California, several undescribed species have been found. In order to have names available for use in a more comprehensive paper, their descriptions are given below. Holotypes of the new species have been deposited in the California Academy of Sciences in San Francisco, paratypes will be deposited as indicated below. We wish to thank Dr. K. V. Krombein at the United States National Museum for comparing types and giving advice on various problems connected with this study. We feel that the new species can be readily recognized from their descriptions, however, they are included in a key supplemented by illustrations in a paper now in progress.

The following abbreviations have been used for the various collections involved: American Museum of Natural History (AMNH); Academy of Natural Sciences at Philadelphia (ANSP); British Museum of Natural History (BMNH); California Academy of Sciences (CAS); California Insect Survey (CIS); Museum of Comparative Zoology (MCZ); University of Arizona (UA); University of California, Davis (UCD); University of California, Riverside (UCR); University of Kansas (UK); United States National Museum (USNM).

Oxybelus californicum Bohart and Schlinger, new species

Male: Length of body 4.5 mm., forewing 3.5 mm. Color, black with yellow and some reddish markings. Mandible mostly, pronotal lobe and angle, fore and mid femora apically, tibiae and tarsi mostly, and tranverse lateral spots on abdominal tergites I and II, yellow. Flagellum apically, tegula, tarsi apically, and pygidium, reddish brown. Squama brownish transparent, mucro brownish becoming black basally. Wings light brown stained, veins brown. Pubescence moderate, silvery, fairly thick on face and mesopleuron. Puncturation moderate, close, rather fine on head and mesonotum, fine and moderately close on abdominal tergites.

Head with apical margin of clypeus nearly truncate medially with a small tooth below antennal socket, interantennal tooth weak and longitudinal, frons at its narrowest point equal to width of compound eye, ocellar

tubercles undeveloped, interocellar area dull and closely punctured, temporal carina sharp and well developed. *Thorax* with sharp and complete pronotal carina, mesonotal groove strong in posterior two-thirds, but weak in anterior one-third, squamal point weak, lateral, surpassed by well developed submedian lobe; mucro expanding slightly towards apex, nearly parallel-sided, moderately emarginate, grooved throughout, semi-elliptically depressed toward apex, its greatest breadth 2.5 times mid ocellus, median carina moderate on postscutellum; posterior area of propodeum obliquely striate, indistinctly areolate, its enclosure long, ovoid, indistinctly carinulate and shiny, lateral area of propodeum carinulate except for smooth basal spot, lateral carina distinct throughout; forewing with median cell very evenly and thickly setose; hind femur with weakly developed distal keel. *Abdomen* slightly constricted between segments, lateral tooth very weak on tergite IV, moderate on V and VI, penult tergite carinate sublaterally, pygidium complete and narrow.

Female: Length of body 4 to 6.5 mm., forewing 2.5 to 5 mm. As described for male except as follows: Color about as in male, but more extensively yellow which usually includes most of pronotal margin, lateral spots on scutellum and postscutellum, quadrate lateral spot on abdominal tergite I, and transverse lateral spots on III and IV; abdominal segments V and VI mostly red. Puncturation on abdominal tergites finer and more polished toward mid line. Mucro somewhat shorter and more shallowly emarginate.

Holotype male: DAVIS, YOLO COUNTY, CALIFORNIA, September 19, 1954, on *Polygonum aubertii* Henry (A. T. McClay). *Paratopotypes:* 120♂♂ and 25♀♀, July to September, 1951 to 1955 (E. I. Schlinger, A. T. McClay, R. C. Bechtel). These specimens will be deposited in the following collections: AMNH, ANSP, BMNH, CAS, CIS, MCZ, UA, UCD, UCR, UK, and USNM.

Specimens have also been examined from the following counties in California: 233♂♂ and 123♀♀ from Butte, Contra Costa, Fresno, Inyo, Kern, Kings, Lassen, Los Angeles, Mariposa, Mendocino, Mono, Monterey, Napa, Nevada, Orange, Riverside, San Bernardino, San Diego, San Joaquin, Shasta, Solano, Sonoma, Stanislaus, Trinity, Tulare, Ventura, and Yolo.

Another 108 specimens were examined from the following western states: Arizona, Idaho, New Mexico, Nevada, Oregon, Utah, and Washington.

The distinct mesonotal groove and narrower mucro distinguishes this species from *emarginatum* Say. The evenly setose median cell of the forewing and the stained wings differentiate it from both *parvum* Cresson and *emarginatum* Say.

This species is common in California where it rivals *quadrinotatum* Say and *emarginatum* Say in abundance.

Oxybelus krombeini Bohart and Schlinger, new species

Agreeing with the above description of *O. californicum* except as follows:

Male: Length of body 4.5 mm., forewing 3.0 mm. Also yellow are: Scape and pedicel mostly, complete band across pronotum, spot on tegula, scutellum laterally, postscutellum mostly, hind femur apically, and prominent subapical bands on tergites I-IV, very narrowly interrupted medially; flagellum brownish yellow, tegula mostly pale orange. Puncturation of abdominal tergites moderate, close, evenly spaced, the integument dull along mid line. *Thorax:* Squama with strong lateral point exceeding weak submedian lobe. *Abdomen:* Lateral tooth weak on tergite III, moderate on IV-VI.

Female: Length of body 5.0 mm., forewing 3.2 mm. As described for male except as follows: antenna mostly brownish yellow, pronotal band narrowly interrupted at middle and beyond humeral angle, postscutellum dark medially, tergal bands more broadly interrupted medially on I and II, V reddish apically, pygidium red with golden setae.

Holotype male: WOODLAKE, TULARE COUNTY, CALIFORNIA, in rotary trap, June 12, 1947 (N. W. Frazier). *Paratypes:* 1 ♀, same data as holotype; 2 ♂ ♂, Three Rivers, Tulare County, California, August 5, 1940 (L. C. Kuitert). *Metatype:* 1 ♂, Turlock, Stanislaus County, California, June 22, 1952 (R. R. Snelling). Paratypes will be deposited in these collections: CIS, UCD, and UK.

This species is very closely related to *californicum*, but the distinctive coloration, puncturation, and form of the squama will easily separate *krombeini*. The tergal yellow bands are somewhat variable. One of the male paratypes has complete bands, and the metatype has them distinctly broken medially.

Oxybelus canalis Bohart and Schlinger, new species

Agreeing with the above description of *O. californicum* except as follows:

Male: Length of body 3.5 mm., forewing 2.4 mm. Pronotum all black, hind femur apically yellow, flagellum testaceous beneath, squama hyaline, wings nearly water clear. Mesonotal punctures and those at middle of tergite II well spaced, shiny between. *Thorax* with deep mesonotal groove, edge sharp, ending in a submedian posterior boss; squamal point strong, submedian lobe hardly developed; mucro with greatest breadth 2.2 times that of mid ocellus, deeply emarginate at apex; median cell of forewing with fine, scattered setae on anterior (leading) one-third, nearly bare otherwise; posterior area of propodeum granulate, obliquely striate above, enclosure broad with cross striae. *Abdomen* with lateral teeth of tergites undeveloped (present but small on V and VI on some paratypes).

Female: Length of body 3 to 4 mm., forewing 2.4 to 3 mm. Agreeing with the description of *O. californicum* female in coloration and pubescence;

puncturation and structure as in male of *canalis* except that mucro averages a little shorter and stouter.

Holotype male: RIVERSIDE, RIVERSIDE COUNTY, CALIFORNIA, June 6, 1943 (P. H. Timberlake). *Paratopotypes:* 6♂♂ and 3♀♀, collected on various desert flowers from April 14 to October 5 (P. H. Timberlake); 1♀, August 2, 1915 (F. C. Bishop). These specimens will be placed in these collections: CAS, UCD, UCR, and USNM. *Other paratypes:* 3♀♀, Hemet, Riverside County, California, August 11, 1946 (C. Grainger) in the CIS collection.

Other specimens examined were 11♂♂ and 9♀♀. 1♀, Redlands, San Bernardino County, California, 1913 (F. R. Cole, USNM); 1♀, Castaic Junction, Los Angeles County, California, IX-11-50 (P. H. Timberlake, UCR); 6♂♂, 4♀♀, Tucson, Arizona, June-July (G. D. Butler, F. Werner, R. H. Crandall, UA, UCD); 1♂, Sabino Canyon, Santa Catalina Mountains, Arizona, VI-29-55 (G. D. Butler, F. Werner, UA); 1♂, Continental, Arizona, VI-14-55 (G. D. Butler, UA); 1♀, Tanque Verde, Arizona, IX-12-55 (F. Werner, UA); 2♀♀, Las Cruces, New Mexico, VI-12-50 (L. D. and R. H. Beamer, UCD, UK); 1♂ Animas, New Mexico, VIII-12-55 (R. R. Dreisbach); 1♂, Roosevelt, Utah, VI-29-54 (G. F. Knowlton, UK); 1♂, Nombre de Dios, Durango, Mexico, VIII-1-51 (P. D. Hurd, CIS).

This species is related to *parvum* Cresson and could be confused with that species on the basis of the nearly asetose median cell. However, the deep and sharply-edged mesonotal groove differentiates *canalis*. With respect to *californicum*, which has a somewhat less developed mesonotal groove, the difference in setation of the median cell is striking.

Oxybelus timberlakei Bohart and Schlinger, new species

Male: Length of body 6 mm., forewing 4.5 mm. Color, black and brown, with whitish yellow and reddish markings. Spot on pronotal lobe, spot on tegula, outer one-third of postscutellum, femora apically, outer surface of tibiae, lateral transverse spots on tergites I to IV, whitish yellow. Mandible mostly, flagellum, fore tibia partly, tarsi dully, abdominal tergites V to VII, sternites III to VII, reddish. Eyes brown. Wing membrane lightly stained, veins brown. Pubescence silvery, thickest on face and mesopleuron and propodeum above. Puncturation moderately close and coarse.

Head with apical margin of clypeus strongly tridentate, middle tooth beak-like, frons at narrowest point 1.2 times width of compound eye, ocellar tubercles and temporal carina undeveloped. *Thorax* with pronotal carina sharp, nearly continuous, not rounded off at pronotal angle, mesonotum with shallow median groove, faint anteriorly, squamal point lateral, depressed, surpassed by submedian lobe; mucro gently flared, slightly emarginate, shallowly grooved throughout, greatest breadth two times mid ocellus, median carina weak on postscutellum; posterior area of propodeum somewhat areolate, enclosure broadly wedge-shaped, weakly carinulate, lateral propodeal carina complete but weak medially, lateral area of propodeum

granulate, weakly carinulate above and behind; median cell of forewing rather densely but somewhat unevenly setose; hind femur with well developed distal keel. *Abdomen* somewhat constricted between segments, lateral tooth weak on tergites III and IV, moderate on V and VI, penult tergite not carinate, last tergite broad, polished laterally and toward base, pygidium poorly defined except in apical third.

Female: Length of body 8 mm., forewing 5.5 mm. As described for male except as follows: Pronotum sometimes all dark brown, tibiae with outer basal whitish yellow spot only, and fore tibia mostly reddish. Pubescence the same, but that of mesonotum partly fulvous, pygidial setae reddish. Clypeus with blunt longitudinal interantennal tubercle, apical clypeal margin nearly truncate medially, toothed below antennal socket, frons at narrowest point 1.5 times width of compound eye; mucro shorter, 1.5 times as long as broad in dorsal view, nearly truncate; lateral propodeal carina crossed by several carinulae; pygidium well developed.

Holotype male: HERKEY CREEK, SAN JACINTO MOUNTAINS, RIVERSIDE COUNTY, CALIFORNIA, June 8, 1937, on *Rhamnus californica* Eschscholtz (P. H. Timberlake). *Paratypes:* 6♂♂ and 3♀♀, all from California as follows: 1♂, Glenville, Kern County, IV–22–50 (R. M. Bohart, UCD); 1♂, Bryson, Monterey County, V–20–20 (E. P. Van Duzee, CAS); 1♂, Palm Springs, Riverside County, V–23–17 (E. P. Van Duzee, CAS); 1♂, Banning, Riverside County, V–28–28 (E. C. Van Dyke, CAS); 1♀, Riverside, VI–23–38 (P. H. Timberlake, UCR); 1♀, Pine Valley, San Diego County, VIII–2–26 (F. W. Kelsey, UCD); 1♂, 14 miles east Santa Maria, Santa Barbara County, VI–20–52 (R. H. and L. D. Beamer, UK); 1♂, California Hot Springs, Tulare County, VI–3–39 (E. C. Van Dyke, CAS). Paratypes will be deposited in the following collections CAS, UCD, UCR, UK, and USNM.

This species is similar to *robertsonii* Baker with which it agrees in the broad short postscutellum and the dense silvery pubescence of the dorsal surface of the propodeum. It can be distinguished from *robertsonii* by the more densely setose median cell of the forewing and the weakly carinate, broadened last abdominal tergite of the male.

This species is named for Mr. P. H. Timberlake whose large collection of Oxybelines has added greatly to our study.

Oxybelus linsleyi Bohart and Schlinger, new species

Male: Length of body 7 mm., forewing 5 mm. Color, black marked with yellow. Mandible mostly, median apex of clypeus, pronotal margin except in middle, postscutellum, legs partly including spot on hind coxa, abdominal tergal bands on I to V, broadened sublaterally on I, narrowly broken medially on I and II, narrow broken bands on sternites II and III,

yellow. Legs partly brown to reddish. Eyes brown. Wing membrane light brown stained, veins brown. Pubescence moderate, greyish to silvery, thick on face. Puncturation close and coarse, punctures of vertex and mesonotum separated by less than puncture diameter.

Head with apical margin of clypeus strongly tridentate, middle tooth somewhat beak-like, frons at narrowest point 1.3 times width of compound eye, ocellar tubercles and temporal carina undeveloped. *Thorax* with pronotal carina distinctly broken at pronotal angle, not sharp, mesonotum not distinctly grooved, postscutellum unevenly and shallowly excavated posteriorly, lateral squamal point surpassing submedian lobe; mucro parallel-sided on basal three-fourths, apical one-fourth narrowing, wedge-shaped, shallowly grooved throughout, its median breadth two times mid ocellus, median carina of postscutellum moderately developed; posterior area of propodeum areolate, enclosure broadly wedge-shaped, shiny, but somewhat carinulate, lateral propodeal carina distinct, unbroken, lateral propodeal area carinulate; median cell of forewing rather sparsely and unevenly setose; hind femur with well developed distal keel. *Abdomen* somewhat constricted between segments, lateral tooth weak on tergite II, strong on II to VI, penult tergite not carinate, pygidium rather broad, with median area separated from lateral area by well developed carina.

Female: As described for male except as follows: Pale color markings nearly ivory, none on head, pronotal band broadly interrupted, legs mostly brownish spotted with ivory, abdominal tergal bands sometimes broadly interrupted, sternal bands often extended. Pubescence sparse on face, mostly fulvous on vertex and mesonotum, silvery and dense on lower occipital orbit, lower mesopleuron and between meso- and metasternum; pygidial setae reddish, penult setae mixed reddish and greyish. Puncturation on mid-vertex somewhat transversely striate; upper anterior mesopleuron shiny with large, sparse punctures. Clypeus with cone-like interantennal tubercle, apical clypeal margin convex medially, toothed below antennal socket; frons at narrowest point about two times width of compound eye; lateral propodeal area polished antero-basally; tarsal segment I of fore leg fringed with nine or ten macrosetae, II to IV each with three, two long and one short.

Holotype male: KEEN CAMP, SAN JACINTO MOUNTAINS, RIVERSIDE COUNTY, CALIFORNIA, May 31, 1939, on *Pentstemon* (E. G. Linsley). *Paratypes:* 7♂♂ and 3♀♀, all from California: Riverside County: 1♂, Idyllwild, VI–19–51 (G. C. Bechtel, UCD); 1♀, Idyllwild, VII–14–12 (P. H. Timberlake, UCR); 1♂, Taquitz Lodge, San Jacinto Mountains, V–13–37 (E. P. Van Duzee, CAS); 1♀, Piñon Flat, San Jacinto Mountains, V–24–39 (E. S. Ross, CAS); Los Angeles County: 1♂, Claremont (C. F. Baker, USNM); 1♂, 1♀, Tanbark Flat, VI–23–50 and VI–27–50 (R. Schuster, CIS, F. X. Williams, CAS); 1♂ Mount Wilson, VI–22–46 (R. M. Bohart, UCD); Tulare County: 1♂, Camp Nelson, VIII–3–13 (R. L. Beardsley, MCZ); Monterey County: 1♂,

Paraiso Springs, V–26–50 (R. M. Bohart, UCD), Arroyo Seco Camp, 24 ♂♂, 14 ♀♀, V–27–56 and VI-6–56 (R. M. Bohart and R. C. Bechtel, UCD).

This species is related to *O. subulatum* Robertson, differing principally in having a broader mucro and a more transverse squama. The female is the only one seen with shaggy, silvery pubescence on the lower mesopleuron, and two large macrosetae on the fore tarsal segments III and IV.

This species is named for Dr. E. G. Linsley, who has collected many interesting Oxybelines.

Oxybelus macswaini Bohart and Schlinger, new species

Male: Length of body 5.5 mm., forewing 3.8 mm. Color, black, with yellow and some reddish markings. Mandible mostly, narrow transverse stripe along pronotal carina, broken medially, lateral scutellar spot, postscutellum except clear membranous squama, mucro basally (clear membranous towards apex), femora partly, tibiae mostly, front tarsus mostly (mid and hind tarsi somewhat reddish), narrow subapical bands on tergites I-IV, median subapical spot on V, yellow. Antenna, tegula, wing veins, tibiae partly, abdominal sternites I-IV, brownish. Abdominal segment V partly, VI-VII entirely, reddish. Pubescence moderate, silvery, thick on face. Puncturation moderately close and coarse.

Head with apical margin of clypeus strongly tridentate, middle tooth somewhat beak-like, frons at narrowest point as wide as compound eye, ocellar tubercles moderately developed, punctured, temporal carina well developed, originating at inferior angle of mandible base. *Thorax* with sharp, nearly continuous pronotal carina, not rounded off at pronotal angle, mesonotal groove shallow, faint anteriorly, postscutellum with semi-circular apical notch, which is three times breadth and equal to length of parallel-sided mucro; mucro truncate apically, longitudinally grooved throughout, median breadth equal to mid ocellus, median carina of postscutellum moderately developed; posterior area of propodeum areolate, enclosure broadly wedge-shaped, smooth and shiny, lateral area of propodeum carinulate, lateral carina distinct and complete; forewing with median cell sparsely and unevenly setose; hind femur with moderately developed distal keel. *Abdomen* not unusually constricted between segments, lateral tooth weak on tergites V-VI, penult tergite not carinate, pygidium narrow, median area separated from lateral area by well developed carina.

Female: Length of body 6 mm., forewing 4 to 5 mm. As described for male except as follows: Color about as in male but yellow markings paler yellow, bands on tergites I and II expanded sublaterally. Clypeus is quinquedentate, teeth smaller, median tubercle carinate; mucro tapers evenly to bluntly rounded apex, its median breadth is about two-fifths its length.

Holotype male: TRACY, SAN JOAQUIN COUNTY, CALIFORNIA, July 29, 1949 (J. W. MacSwain). *Paratypes:* 1♂ and 2♀♀, same data as holotype except, 1♀, VIII–1–48 (J. W. MacSwain) and

1♀, VI–21–49 (R. F. Smith). Paratypes will be deposited in the CIS, UCD, and USNM collections.

O. macswaini is closely related to *laetum* Say, but differs in having a strong temporal carina, having the squamal points closer together, the postscutellar carina less projecting, the male penult tergite not carinate, the male pygidium red instead of black, and the female clypeus with a median apical tooth.

Oxybelus xerophilum Bohart and Schlinger, new species

Male: Agreeing with above description of male of *O. macswaini* except as follows: Length of body 5.0 mm., forewing 3.5 mm. Head and thorax except legs without bright yellow markings, but brownish yellow on mandible mostly, tegula partly, and tarsi mostly; basal sternites black, abdominal segments V-VII reddish; pronotal angle, squamal membrane and mucro distally whitish; eyes brown. Punctures somewhat sparser, those on vertex separated by their diameters or more.

Clypeal margin with mid tooth smaller than lateral ones, squamal points of postscutellum separated by three-fifths of postscutellar breadth (one-half in *macswaini*), hind femur with small distal keel. Lateral tergal teeth present but weak on III-VI.

Holotype male: STOVEPIPE WELLS, DEATH VALLEY, INYO COUNTY, CALIFORNIA, March 30, 1953 (J. W. MacSwain). *Metatypes:* 2♂♂, Willcox, Arizona, VII–9–55 (G. Butler, F. Werner, UA) and VIII–5–55 (R. R. Dreisbach, UCD).

O. xerophilum is related to *macswaini* but differs primarily in the brown eyes, and the more widely separated squamal points as in *laetum*. The latter has grey eyes and dark posterior abdominal tergites.

Oxybelus crandalli Bohart and Schlinger, new species

Female: Length of body 4.0 mm., forewing 3.0 mm. Color, black with whitish yellow and some brown markings. Mandible mostly, scape, pronotum, tegula partly, scutellar spots, squama medially (otherwise translucent), mucro distally, fore and mid femora and tibiae mostly, basal spot on hind tibia, double median spot at summit of tergite I, faint posterior fasciae on tergites II-IV, whitish yellow. Flagellum and fore tarsus light brown. Mandible apex, clypeal margin, legs partly, spot on tegula, wing veins, dark brown. Eyes grey. Pubescence dense, mostly appressed, silvery, thick over most of body including propodeum dorsally and laterally; scattered over tergites but concentrated into posterior bands on I-V; venter with scattered upright pubescence suggesting sternal bands. Puncturation moderate, rather coarse and sparse on mesonotum and scutellum, similar on mesopleuron but obscured by pubescence, medium and close on tergites.

Head with clypeal margin quadridentate, no median tooth, a small knob above; frons at narrowest point 1.5 times width of compound eye, ocellar tubercles small and shiny; temporal carina undeveloped. *Thorax* with

complete pronotal carina; mesonotal groove apparently absent; squamal point short and broad, no submedian lobe; postscutellum twice as broad as squamal length; median carina faint on postscutellum; mucro damaged, flaring, apparently short, narrow basally; dorso-lateral propodeal carina projecting shelf-like; forewing with median cell setose along anterior one-third; hind femur without definite distal keel. *Abdomen* slightly constricted between segments, pygidial setae silvery.

Holotype female: TUCSON, ARIZONA, June 13, 1938 (R. H. Crandall). This peculiar *Oxybelus* appears to have no close relatives. It is the only one we have seen with appressed silvery pubescence on the propodeum laterally, and with enlarged pale markings toward the middle of the first abdominal tergite. We have seen a male from Lewisville, Arkansas, June 2, 1919 (J. C. Bradley, Cornell University) which agrees in all important respects, and is probably the same species. The mucro is similar to that of *parvum* Cresson, narrow at the base, flared and emarginate distally.

Oxybelus hurdi Bohart and Schlinger, new species

Male: Length of body 6.0 mm., forewing 5.0 mm. Color, black, with yellow and some reddish markings. Humeral spot, fore and mid tibiae mostly, hind tibia partly, lateral spots on tergites I-II, bands across III-VI, narrowly broken on III-IV, deep ivory yellow. Flagellum beneath, entirely toward apex except for all black last segment, mandible mostly, tarsi partly, reddish. Tegula, wing veins, tip of hind femur, mucro, brownish to dark brown. Squama dirty whitish. Eyes greenish tan. Pubescence silvery on head and mesopleuron, fairly thick on face and gena, sparse elsewhere, fulvous on mesonotum. Puncturation coarse, particularly on abdominal tergites.

Head with apical margin of clypeus moderately tridentate, frons at narrowest point as wide as compound eye, lateral ocellar tubercles prominent, and smooth, vertex tubercle present and prominent, no temporal carina.

Thorax with sharp, continuous pronotal carina, no mesonotal groove, squama large, point posterior, inner posterior margin of squama forming a broad inverted V, mucro large, expanding gradually toward apex which is sharply emarginate; propodeum areolate above, mostly smooth posteriorly, but finely punctate, enclosure stout and shiny, lateral carina sharp and complete, lateral surface rather shiny with a few large oblique carinae; forewing with median cell thickly setose on anterior two-fifths, sparsely so otherwise; hind femur with distal keel produced about three ocellus diameters into an extremely prominent, broad, convex lamina. *Abdomen* constricted between segments, submedially depressed, deeply channeled at middle of first tergite, laterally toothed on tergites II-V, sublaterally carinate on VI, pygidium narrowly wedge-shaped.

Female: Length of body 8.0 mm., forewing 7.5 mm. As described for male except as follows: Pronotum, mid and hind tibia entirely, tarsi mostly dark. Clypeus obscurely 5-lobed, baso-median tubercle prominent, somewhat longitudinal, with sparse long hair. Pubescence of face rather sparse.

Mucro broad but sides nearly parallel. Penult tergite and pygidium with light golden setae.

Holotype male: AHUACATLAN, NAYARIT, MEXICO, July 18, 1951 (P. D. Hurd) on *Donnellsmithia Hintonii*. *Paratopotype:* 1 ♀, same data as holotype, in CIS collection.

O. hurdi is most closely related to *cochise* Pate and the male has similar antennal coloration. However, the broad and emarginate mucro, together with the greatly produced hind femoral apex distinguish it from all related species, including *cornutum* Robertson and *subcornutum* Cockerell.

This species is named for P. D. Hurd, Jr., whose extensive collections of this genus both in Mexico and California have added greatly to our knowledge.

ZOOLOGICAL NOMENCLATURE: NOTICE OF PROPOSED USE OF THE PLENARY POWERS IN CERTAIN CASES FOR THE AVOIDANCE OF CONFUSION AND THE VALIDATION OF CURRENT NOMENCLATORIAL PRACTICE (A.(N.S.)26)

Notice is hereby given that the possible use by the International Commission on Zoological Nomenclature of its Plenary Powers is involved in applications relating to the under-mentioned names included in Part II of Volume II of the *Bulletin of Zoological Nomenclature*, which will be published on 9th May, 1956.

(1) *daea* Dampf, 1910 *(Palaeopsylla)* (Class Insecta, Order Siphonaptera), determination of (Z.N. (S.)846).

The present notice is given in pursuance of decisions taken on the recommendation of the International Commission on Zoological Nomenclature by the Thirteenth International Congress of Zoology, Paris, July 1948 (see *Bull. zool. Nomencl.* 4:51–56, 57–59; *ibid.* 5:5–13, 131).

Any specialist who may desire to comment on any of the foregoing applications is invited to do so in writing to the Secretary to the International Commission (Address: 28 Park Village East, Regent's Park, London, N.W.1, England) as soon as possible. Every such comment should be clearly marked with the Commission's File Number as given in the present Notice.—FRANCIS HEMMING, *Secretary to the International Commission on Zoological Nomenclature.*

AN ANNOTATED SYNONYMICAL LIST OF NORTH AMERICAN OXYBELUS

(Hymenoptera: Sphecidae)

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Since the appearance of the Hymenoptera Catalogue[1], many changes in nomenclature have been discovered pertaining to the genus *Oxybelus* Latreille. Some of these changes were reported by Krombein[2] who synonymized 10 of the 65 species listed in the catalogue. We have recorded here 32 more synonyms, and have added ten species recently described. The total number of recognized species and subspecies in this list is 50[3]. This number represents about 50 per cent of the names which have been proposed since the first species, *quadrinotatum* Say, 1824, was described from North America.

As Pate[4] pointed out, the name *Oxybelus* is neuter and not masculine gender. This necessitates changing several name endings to bring them into agreement with *Oxybelus*. All the specific names known to us for this region have been cited below, including four old names which were unintentionally omitted from the Hymenoptera Catalogue.

We wish to thank K. V. Krombein of the United States National Museum and L. W. Quate of the University of Nebraska for their assistance in examining and making available various type specimens necessary for this study. Comparisons with types were made also by W. L. Brown, Jr., of the Museum of Comparative Zoology and H. L. Grant, Jr., of the Academy of Natural Sciences at Philadelphia.

Genus OXYBELUS Latreille

Oxybelus Latreille, 1796. Précis Caract. Gén. Ins., p. 129. No species.

This generic name was apparently derived from the Greek *Oxy-* (= sharp) and *belos* (= dart or spear), the noun *belos* being of neuter gender.

Type species: Vespa uniglumis Linnaeus. First included species, Latreille, 1802.

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[1] Burks, B. D. in Muesebeck, C. F. W., et al, 1951, Hymenoptera of America north of Mexico, Synoptic Catalogue, U.S. Dept. Agr., Agri-Monograph No. 2, pp. 1030-1034.

[2] Krombein, K. V., 1955. Bull. Brooklyn Ent. Soc. 50:70-74.

[3] This number does not include *O. analis bimini* Krombein from the British West Indies (1953, Amer. Mus. Nov. 1633:18).

[4] Pate, V. S. L., 1937. Phil. Jour. Sci. 64:376, footnote.

(For a complete generic synonymy, see the Hymenoptera Catalogue cited above, see footnote[1].)

An Alphabetical List of the *Oxybelus* Species of North America[5].

1. **abdominale** Baker (U.S. west of 100th Meridian, north to Idaho, Nebraska).
   Oxybelus abdominalis Baker, 1896. Ent. News 7:158. Type ♂, Colorado.
   Notoglossa calligaster Viereck, 1906. Trans. Amer. Ent. Soc. 32:214. Type ♀, Kansas. Specimens from Kansas which fit Viereck's description agree with females of *abdominale* from several western states. *New Synonymy.*
   acutus Baker=subulatum Robertson
   albomaculata Mickel=taenigaster (Viereck)
   albosignatus Smith=subulatum Robertson
   americana Robertson=emarginatum Say
2. **anale** Cresson (Cuba and Nicaragua).
   Oxybelus analis Cresson, 1865. Proc. Ent. Soc. Phila. 5:149. Types 4♂♂, 2♀♀, Cuba. We have seen many specimens from Havana, Cuba, and one ♂ from Granada, Nicaragua.
   apicatus Smith=robertsonii Baker
   argentarius Mickel=exclamans Viereck
3. **argenteopilosum** Cameron (Western North America from Oregon and Colorado south to Tehuantepec, Mexico).
   Oxybelus argenteopilosus Cameron, 1891. Biologia Cent. Amer., Insecta, Hymen., Fossores 2:158. Type (no sex given), Guerrero, Mexico.
4. **argypheum** Bohart and Schlinger (California, Arizona, and Colorado).
   Oxybelus argypheum Bohart and Schlinger, 1956. Proc. Biol. Soc. Wash., 69:38. Type ♀, California.
5. **aztecum** Cameron (Vera Cruz, Mexico).
   Oxybelus aztecus Cameron, 1891. Biologia Cent. Amer., Insecta, Hymen., Fossores 2:157. Type, apparently ♀, Vera Cruz, Mexico. We have not seen this species.
6. **bipunctatum** Olivier (Europe; U.S., in New England States).
   Oxybelus bipunctatus Olivier, 1811. Encycl. Méthod. Ins. 8:597. Europe. This is apparently an introduced species.
   Oxybelus nigroaeneus Shuckard, 1837. Essay on Indig. Fossor. Hymen., p. 113. Type ♂, Europe.
   Oxybelus laevigatus Schilling, 1848. Schles. Gesell. Vaterland. Kult. Arb. im Jahre 1847, p. 105. Europe.
   Brodiei Provancher=uniglumis quadrinotatum Say

[5] The distribution cited in parenthesis following the specific name is based primarily on observed specimens, and does not include recorded distribution of other workers, except where no doubt of the species was evident. Also, due to the small number of workers with this genus in our region, no complete citation for each species seemed necessary. Only the species and subspecies that were considered valid have been numbered.

7. **bugabense** Cameron (Panama).
   Oxybelus bugabensis Cameron, 1891. Biologia Cent. Amer., Insecta, Hymen., Fossores 2:156. Type ♀, Panama. We have seen one male from Corozal, Canal Zone. This species is related to *frontale* and may be synonymous with *mexicanum*.
8. **californicum** Bohart and Schlinger (Western U.S. and northern Mexico).
   Oxybelus californicum Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:147. Type ♂, California.

   calligaster Viereck=abdominale Baker
9. **canalis** Bohart and Schlinger (Southwestern U.S., north to Utah; northern Mexico).
   Oxybelus canalis Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:149. Type ♂, California.

   carolinus Banks=packardi Robertson
10. **cochise** Pate (Southwestern U.S. and Baja California, Mexico).
    Oxybelus cochise Pate, 1943. Bull. Brooklyn Ent. Soc. 38:93. Type ♂, New Mexico.

    cockerelli Baker=subcornutum Cockerell
11. **cocopa** Pate (Southern California).
    Oxybelus cocopa Pate, 1943. Pan-Pac. Ent. 19:121. Type ♂, California.

    coloradensis Baker=parvum Cresson
12. **cornutum** Robertson (U.S. west of 100th Meridian: Montana south to Guadalajara, Mexico).
    Oxybelus cornutus Robertson, 1889. Trans. Amer. Ent. Soc. 16:80. Type ♂, Montana.
    Oxybelus quadricolor Cockerell and Baker, 1896. Psyche 7 (supp.): 21. Type ♀, New Mexico.
    Oxybelus polygoni Rohwer, 1909. Trans. Amer. Ent. Soc. 35:116. Type ♀, Colorado.
13. **crandalli** Bohart and Schlinger (Arizona and Arkansas).
    Oxybelus crandalli Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:154. Type ♀, Arizona.
14. **cressonii** Robertson (Central U.S.; Utah and Texas east to Virginia, north to Michigan).
    Oxybelus cressonii Robertson, 1889. Trans. Amer. Ent. Soc. 16:83. Type ♀, Illinois.
15. **decorosum** (Mickel) (U.S. east of 100th Meridian; Vermont and Minnesota south to Florida).
    Notoglossa decorosa Mickel, 1916. Trans. Amer. Ent. Soc. 42:430. Type ♀, Nebraska.

    defectus Cockerell and Baker=packardi Robertson

    delicatus Mickel=sericeum Robertson

    denverensis Rohwer=subcornutum Cockerell

    dilutus Baker=emarginatum Say
16. **emarginatum** Say (U.S.; southern Canada, south, nearly to Mexico City).

Oxybelus emarginatus Say, 1837. Bost. Jour. Nat. Hist. 1:375. Type ♂, Indiana.

Oxybelus dilutus Baker, 1896. Ent. News 7:159. Type ♀, Colorado. The mucro of the holotype is more slender than usual, but falls within the limits of *emarginatum*. *New Synonymy*.

Oxybelus trifidus Cockerell and Baker, 1896. Psyche 7 (supp.):23. Type ♂, New Mexico. The species name was based on an imperfection of the mucro. *New Synonymy*.

Notoglossa americana Robertson, 1901. Trans. Amer. Ent. Soc. 27:204. Types ♂ ♀, Illinois. Paratypes of *americana* in the Illinois Natural History Survey collection were compared by B. D. Burks with specimens of *emarginatum* determined by K. V. Krombein and were found to be conspecific, according to a letter from Dr. Krombein. *New Synonymy*.

Notoglossa pacifica Rohwer, 1909. Trans. Amer. Ent. Soc. 35:119. Type ♂, Washington.

Notoglossa minor Mickel, 1916. Trans. Amer. Ent. Soc. 42:428. Type ♂, Nebraska. The holotype appears to be merely a small *emarginatum*. *New Synonymy*.

17. **exclamans** Viereck (Western U.S., north to S. Dakota, east to Alabama, Florida, south to Chihuahua, Mexico).

Oxybelus exclamans Viereck, 1906. Trans. Amer. Ent. Soc. 32:215. Type ♀, Kansas.

Oxybelus townsendi Rohwer and Cockerell, 1908. Ent. News 19:180. Type ♂, New Mexico. Our specimens fit the description of *exclamans* exactly. *New Synonymy*.

Oxybelus argentarius Mickel, 1916. Trans. Amer. Ent. Soc. 42:431. Type ♀, Nebraska. The type of *argentarius* was found to agree well with ♀♀ of an associated series of ♂♂ and ♀♀ of *exclamans*. *New Synonymy*.

Oxybelus pectorosus Mickel, 1918. Univ. Studies (Nebraska) for 1917, 17:321. Type ♂, Nebraska. The type has the mucro imperfect distally. It agrees well with a specimen compared with the type of *townsendi* by Dr. Krombein. *New Synonymy*.

fastigatus Mickel=taenigaster (Viereck)

floridanus Robertson=laetum fulvipes Robertson

18. **fossor** Rohwer and Cockerell (U.S. west of 100th Meridian, north to Nebraska; Baja California, Mexico).

Oxybelus fossor Rohwer and Cockerell, 1908. Ent. News 19:179. Type ♀, New Mexico.

Oxybelus umbrosus Mickel, 1916. Trans. Amer. Ent. Soc. 42:432. Type ♂, Nebraska.

Oxybelus puente Pate, 1943. Pan-Pac. Ent. 19:125. Type ♂, California. We have seen topotypical specimens of *puente* which agree with variations found in the widespread *fossor*. *New Synonymy*.

19. **frontale** Robertson (U.S. east of Rocky Mountains: Texas north to Michigan and Pennsylvania).

Oxybelus frontalis Robertson, 1889. Trans. Amer. Ent. Soc. 16:83. Types ♂ ♀, Pennsylvania, Illinois, and Texas.

fulvipes Robertson, see laetum fulvipes Robertson

glenensis H. S. Smith=robertsonii Baker

heterolepis Cockerell=packardi Robertson

hirsutus Baker=robertsonii Baker

20. **hurdi** Bohart and Schlinger (Nayarit, Mexico).

Oxybelus hurdi Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:155. Type ♂, Mexico.

impatiens Smith=uniglumis quadrinotatum Say

incisura Mickel=parvum Cresson

21. **inornatum** (Robertson) (Northeastern U.S., Michigan to Massachusetts, and south to North Carolina).

Notoglossa inornata Robertson, 1901. Trans. Amer. Ent. Soc. 27:203. Types ♂ ♀, Illinois.

intermedium Baker=parvum Cresson

22. **krombeini** Bohart and Schlinger (California).

Oxybelus krombeini Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:149. Type ♂, California.

23. **laetum** Say (U.S. east of 100th Meridian; Texas to North Carolina, north to Michigan and Massachusetts).

Oxybelus laetus Say, 1837. Bost. Jour. Nat. Hist. 1:375. Type ♂, Illinois.

24. **laetum fulvipes** Robertson, new combination (Southeastern coastal states, north to Virginia).

Oxybelus fulvipes Robertson, 1889. Trans. Amer. Ent. Soc. 16:82. Type ♂, Florida.

Oxybelus floridanus Robertson, 1901. Trans. Amer. Ent. Soc. 27:203. Type ♂, Florida. *New Synonymy.*

laevigatus Schilling=bipunctatum Olivier

25. **linsleyi** Bohart and Schlinger (California).

Oxybelus linsleyi Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:151. Type ♂, California.

26. **longispina** Cameron (Yucatan, Mexico).

Oxybelus longispina Cameron, 1891. Biologia Cent. Amer., Insecta, Hymen.; Fossores 2:157. Type ♂, Yucatan. We have not seen this species.

27. **macswaini** Bohart and Schlinger (California and Arizona).

Oxybelus macswaini Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:153. Type ♂, California.

28. **majus** Mickel (Eastern U.S.; Texas to North Carolina, north to Michigan and Virginia).

Oxybelus major Mickel, 1916. Trans. Amer. Ent. Soc. 42:434. Type ♂, Nebraska. The abdomen of the holotype is missing and the mucro is broken near the tip.

manni Rohwer=ventrale Fox

29. **mexicanum** Robertson (Mexico, British Honduras, and Nicaragua).

Oxybelus mexicanus Robertson, 1889. Trans. Amer. Ent. Soc. 16:83. Type ♀, "Mexico". We have seen males from Belize, British Honduras, and San Marcos, Nicaragua.

minor Mickel=emarginatum Say

montanus Robertson=uniglumis quadrinotatum Say

mottensis Mickel=subulatum Robertson

mucronatus Packard=subulatum Robertson

30. **nigrum** Robertson (Southeastern Canada; northeastern U.S., from Illinois to Minnesota and New York).

Oxybelus niger Robertson, 1889. Trans. Amer. Ent. Soc. 16:82. Type ♂, Illinois.

nigroaeneus Shuckard=bipunctatum Olivier

pacifica Rohwer=emarginatum Say

Packardi Dalla Torre=subulatum Robertson

31. **packardii** Robertson (U.S.; California to Texas and Florida, north to Ohio and Illinois).

Oxybelus Packardii Robertson, 1889. Trans. Amer. Ent. Soc. 16:80. Types ♂ ♀, Illinois and Texas. This species was placed as a synonym of *laetum* by Krombein (1955), however, we believe that the two species are distinct, and Krombein has indicated his agreement in a letter of January 3, 1956.

Oxybelus Packardii var. *texanus* Robertson, 1889. Trans. Amer. Ent. Soc. 16:81. Types ♂ ♀, Texas. *New Synonymy.*

Oxybelus heterolepis Cockerell and Baker, 1896. Psyche 7 (supp.): 22. Type ♂, New Mexico. *New Synonymy.*

Oxybelus heterolepis var. *defectus* Cockerell and Baker, 1896. Psyche 7 (supp.):23. Type ♂, New Mexico. *New Synonymy.*

Oxybelus unicus Mickel, 1918. Univ. Studies (Nebraska) for 1917, 17:323. Type ♀, Nebraska. *New Synonymy.*

Oxybelus carolinus Banks, 1921. Ann. Ent. Soc. Amer. 14:18. Type ♀, North Carolina. On the basis of information on the holotype, furnished by Dr. Brown, we feel this species is *packardii. New synonymy.*

32. **paenemarginatum** (Viereck) (Kansas).

Notoglossa paenemarginatus Viereck, 1906. Trans. Amer. Ent. Soc. 32:214. Type ♀, Kansas. We have not recognized this species. Perhaps it is a variety of *emarginatum* Say.

33. **paracochise** Bohart and Schlinger (Arizona and Texas; northern Mexico).

Oxybelus paracochise Bohart and Schlinger, 1956. Proc. Biol. Soc. Wash. 69:37. Type ♂, Arizona.

34. **parvum** Cresson (U.S. west of 100th Meridian; Nebraska and Utah, to southern California, and south to northern Mexico).

Oxybelus parvus Cresson, 1865. Proc. Ent. Soc. Phila. 4:476. Type ♀, Colorado Territory.

Oxybelus intermedius Baker, 1896. Ent. News 7:160. Type ♀, Colorado. *New Synonymy.*

Oxybelus coloradensis Baker, 1896. Ent. News 7:160. Type ♂, Colorado. *New Synonymy.*

Notoglossa incisura Mickel, 1916. Trans. Amer. Ent. Soc. 42:430. Type ♂, Nebraska. *New Synonymy.*

pectorosus Mickel=exclamans Viereck

35. **pitanta** Pate (Southwestern U.S., California and Nevada to New Mexico).

Oxybelus pitanta Pate, 1943. Pan-Pac. Ent. 19:123. Type ♂, California.

polygoni Rohwer=cornutum Robertson

puente Pate=fossor Rohwer and Cockerell

punctatus Baker=subcornutum Cockerell

36. **pyrura** (Rohwer) (Guatemala).

Notoglossa pyrura Rohwer, 1914. Proc. U.S. Nat. Mus. 47:520. Type ♀, Guatemala. We have not seen this species.

quadricolor Cockerell and Baker=cornutum Robertson

quadrinotatus Say, see uniglumis quadrinotatum Say

37. **rancocas** Pate (New Jersey).

Oxybelus rancocas Pate, 1943. Bull. Brooklyn Ent. Soc. 38:91. Type ♂ New Jersey. We have seen the paratype male of this unusual species.

38. **rejectum** Baker (Colorado).

Oxybelus rejectus Baker, 1896. Ent. News 7:59. Type ♂, Colorado. Known only from the type, this may prove to be an abberant *cornutum.*

39. **robertsonii** Baker (Northwestern U.S.; Nebraska to Oregon, south to California and Nevada).

Oxybelus robertsonii Baker, 1896. Ent. News 7:156. Type ♂, Colorado.

Oxybelus varicoloratus Baker, 1896. Ent. News 7:157. Type ♀, Colorado.

Oxybelus hirsutus Baker, 1896. Ent. News 7:157. Type ♀, Colorado.

Oxybelus apicatus H. S. Smith, 1908. Univ. Studies (Nebraska) 8:409. Type ♂, Nebraska. *New Synonymy.*

Oxybelus glenensis H. S. Smith, 1908. Univ. Studies (Nebraska) 8:410. Type ♀, Nebraska. An examination of the holotypes of *apicatus* and *glenensis* in the Univ. of Nebraska collection has shown them to be the two sexes of *robertsonii. New Synonymy.*

40. **sericeum** Robertson (U.S., south to La Paz, Baja California, Mexico).

Oxybelus sericeus Robertson, 1889. Trans. Amer. Ent. Soc. 16:81. Type ♀, Illinois.

Oxybelus delicatus Mickel, 1918. Univ. Studies (Nebraska) for 1917, 17:322. Type ♂, Nebraska. We have seen the holotype of *delicatus.*

41. **sericeum crocatum** Krombein (Mississippi and Georgia).

Oxybelus sericeus crocatus Krombein, 1955. Bull. Brooklyn Ent. Soc. 50:73. Type ♂, Mississippi.

42. **simile** Cresson (U.S. west of Rocky Mountains).

Oxybelus simile Cresson, 1865. Proc. Ent. Soc. Phila. 4:476. Type ♀, Colorado.

Notogonia striatifrons Mickel, 1916. Trans. Amer. Ent. Soc. 42:429. Type ♂, Wyoming. H. L. Grant has furnished us with a drawing of the holotype squamae and mucro of *simile*. It agrees with the holotype of *striatifrons* except in the more rectangular mucro of the former. However, some of our specimens show variation in this respect. *New Synonymy*.

43. **sparideum** Cockerell (Southwestern U.S., Arizona to Texas and Oklahoma, south to Vera Cruz, Mexico).

Oxybelus sparideus Cockerell, 1895. Trans. Amer. Ent. Soc. 22:292. Type ♂, New Mexico. We have seen specimens from Vera Cruz, Mexico, which appear to be conspecific with *sparideum*.

striatifrons Mickel=simile Cresson

striatus Baker=subcornutum Cockerell

44. **subcornutum** Cockerell (U.S. from Arizona to east coast, Michigan south to Chihuahua, Mexico).

Oxybelus subcornutus Cockerell, 1895. Trans. Amer. Ent. Soc. 22:293. Type ♀, New Mexico.

Oxybelus navarella Baker, 1896. Ent. News 7:61. Type ♂, Colorado. We have seen a paratype ♂ which agrees well with *subcornutum*. *New Synonymy*.

Oxybelus gibbosus Baker, 1896. Ent. News 7:60. Type ♂, Colorado. According to Dr. Krombein, the mucro and squamae of the holotype are somewhat deformed, but it agrees in most respects with *subcornutum*. *New Synonymy*.

Oxybelus denverensis Reinwer, 1909. Trans. Amer. Ent. Soc. 35:118. Type ♀, Colorado. The description of *denverensis* falls within the limits of *subcornutum*. *New Synonymy*.

Oxybelus striatus Baker, 1896. Ent. News 7:60. Type ♂, Colorado. The description of *striatus* also agrees with *subcornutum*. *New Synonymy*.

45. **subulatum** Say (Northeastern U.S.: Colorado to Massachusetts, north to Canada).

Oxybelus uniglumis Packard, 1867. Proc. Ent. Soc. Phila. 6:436. Types ♂♀, Pennsylvania and Illinois. Preoccupied by Fabricius, 1793.

Oxybelus solitarius Robertson, 1889. Trans. Amer. Ent. Soc. 16:79. Types ♂♀, Colorado, Montana, Illinois, and Pennsylvania.

Oxybelus subangustus H. S. Smith, 1908. Univ. Studies (Nebraska) 8:85. Type ♀, Nebraska. The ♀ paratype falls within the varietal limits of *subulatum*. *New Synonymy*.

Oxybelus Packardi Dalla Torre, 1890. Wien. Ent. Zeit. 9:206. New name, preoccupied by Robertson, 1889.

Oxybelus acutus Baker, 1896. Ent. News 7:61. Type ♀, Colorado. The species was based on the short, sharp mucro, but our specimens show this feature to be variable. *New Synonymy*.

Oxybelus mottensis Mickel. 1918. Univ. Studies (Nebraska) for 1917, 17:323. Type ♀, North Dakota. We have examined the holotype of *mottensis. New Synonymy.*

46. **taenigaster** Viereck (West Central U.S., Nebraska south to Oaxaca, Mexico).

Notoglossa taenigaster Viereck, 1906. Trans. Amer. Ent. Soc. 32:215. Type ♀, Kansas.

Oxybelus fastigatus Mickel. 1916. Trans. Amer. Ent. Soc. 42:433. Type ♂, Nebraska. The holotype has been examined and compared with a paratype of *albomaculata. New Synonymy.*

Notoglossa albomaculata Mickel. 1918. Univ. Studies (Nebraska) for 1917, 17:320. Type ♂, Nebraska. We have seen a ♂ paratype which agrees with our interpretation of *taenigaster. New Synonymy.*

texanus Robertson=packardii Robertson

47. **timberlakei** Bohart and Schlinger (California).

Oxybelus timberlakei Bohart and Schlinger. 1956. Pan-Pac. Ent. 32:150. Type ♂, California.

townsendi Rohwer and Cockerell=exclamans Viereck

trifidus Cockerell and Baker=emarginatum Say

umbrosus Mickel=fossor Rohwer and Cockerell

unicus Mickel=packardii Robertson

48. **uniglumis quadrinotatum** Say, new combination (U.S.: southern Canada, south to Puebla, Mexico).

Oxybelus quadrinotatus Say. 1824. In Keating, Narr. Long's 2nd Exped., 2 (appen.):338. Type (no sex given), Pennsylvania.

Oxybelus impatiens Smith. 1856. Cat. Hymen. Brit. Mus. 4:390. Type ♀, California.

Oxybelus interruptus Cresson, 1865. Proc. Ent. Soc. Phila. 4:475. Type ♀, Colorado Territory.

Oxybelus Brodiei Provancher, 1883. Nat. Canad. 14:36. Type ♀.

Oxybelus quadrinotatus var. *montanus* Robertson, 1889. Trans. Amer. Ent. Soc. 16:78. Types ♂♀, Montana. This variety is merely one of many occurring throughout the population of *quadrinotatum. New Synonymy.*

uniglumis uniglumis (Linnaeus) occurs in Europe

49. **ventrale** Fox (Pacific Coast States: Baja California, Mexico, north to Washington).

Oxybelus ventralis Fox, 1894. Proc. Calif. Acad. Sci. (2) 4:107. Type ♀, Baja California, Mexico.

Oxybelus manni Rohwer, 1909. Trans. Amer. Ent. Soc. 35:117. Type ♀, Washington. The description of *manni* falls within the limits of *ventrale* specimens. *New Synonymy.*

50. **xerophilum** Bohart and Schlinger (California and Arizona).

Oxybelus xerophilum Bohart and Schlinger, 1956. Pan-Pac. Ent. 32:154. Type ♂, California.

INSECTS FOUND ASSOCIATED WITH OSMIA LIGNARIA PROPINQUA CRESSON IN A COLORADO NESTING SITE

(Hymenoptera: Megachilidae)

On September 4, 1954, one and a half miles north of Rustic, Colorado, in La Poudre River Valley, I excavated a small group of *Anthophora* bee tunnels constructed in a hard earth bank which had been formed by a road cut. Only one *Anthophora* larva was found, which failed to mature and thus could not be identified. In the *Anthophora* tunnels were a number of cells occupied by pupae and adults of *Osmia lignaria propinqua* Cresson. Two of the *Osmia* cells were infested by pupae of a ptinid beetle, which were reared and identified as the depredator *Ptinus californicus* Pic. A single female of a sapygid wasp was reared from one *Osmia* cell, and has been tentatively identified as *Sapyga angustata* Cresson. If the identification is correct, this is a new host for the species, although *Sapyga emarginata* Cresson has been reared from the same species in Colorado.[1] Also found in the burrows were three adult specimens of the meloid beetle *Tricrania stansburyi* Haldeman. One of the meloids was found occupying an *Osmia* cell. It was not determined whether the other two had been associated with *Anthophora* or *Osmia* cells. *T. stansburyi* has apparently not been previously recorded from this species of *Osmia*.[2] For the identifications made above I am indebted to Robert C. Bechtel, Paul D. Hurd, E. Gorton Linsley, and John W. MacSwain.—R. S. BEAL, JR.

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[1] Linsley, E. Gorton, 1944. Host relationships of some sapygid wasps (Hymenoptera, Sapygidae). Bull. Brooklyn Ent. Soc., 39:54-55.

[2] Linsley, E. G., and J. W. MacSwain, 1951. Notes on the biology of *Tricrania stansburyi* Haldeman (Coleoptera, Meloidae). Bull. So. Calif. Acad. Sci., 50:92-95.

A NEW SPECIES OF MITE, PARANEONYSSUS ICTERIDIUS, FROM THE NASAL CAVITIES OF BLACKBIRDS

(Acarina: Rhinonyssidae)

R. W. STRANDTMANN[1] AND DEANE P. FURMAN[2]

Mesostigmatid nasal mites of birds have been known since the last century. Until recently, however, little was known of the incidence and geographical distribution of what is now recognized to be a family composed of numerous genera and many species of mites living in the avian respiratory tract. The reason for this lies in the cryptic habitat of these blood sucking parasites. Ordinary collecting techniques do not reveal their presence. Only when the nares are opened or flushed out are the mites exposed.

The new species of *Paraneonyssus* described here is one found to be of very common occurrence on several icterid birds in California and Texas.

PARANEONYSSUS Castro 1948:274

Small, elongated nasal mites with two large dorsal shields and short peritremes. Stigmata dorsal and over coxa III. Sternal, epigynial and anal plates present. Sternal plate longer than wide, with two pairs of pores. The sternal setae present but not always on the plate. Epigynial plate rounded posteriorly and bearing a pair of setae. Anal plate generally oval and probably always with three setae and a cribrum. Movable segments of the palp longer than the fused coxae. Deutosternal teeth present; tined palpal seta present. Chelicerae slender, long, not attenuated or if so, only the apical one-half or less is involved. *Chelae very small, less than one-tenth the total length of the chelicerae.*

De Castro (1948) proposed the name *Paraneonyssus* as a subgenus of *Neonyssus* for those nasal mites with two large dorsal plates in which the posterior plate is large but narrower than the anterior. In 1949 Pereira and de Castro revised the classification of the Rhinonyssidae, and placed considerably more emphasis on the chelicerae. This resulted in a more natural arrangement and it became apparent that mites of the *Paraneonyssus* complex are much more closely related to *Ptilonyssus* than to *Neonyssus*. *Paraneonyssus* was accordingly made a subgenus of *Ptilonyssus*.

Ptilonyssus, sensu strictu, always has a small pygidial plate and the chelicerae are always strongly and abruptly attenuated.

Both *Paraneonyssus* and *Ptilonyssus* parasitize only Passeriform birds.

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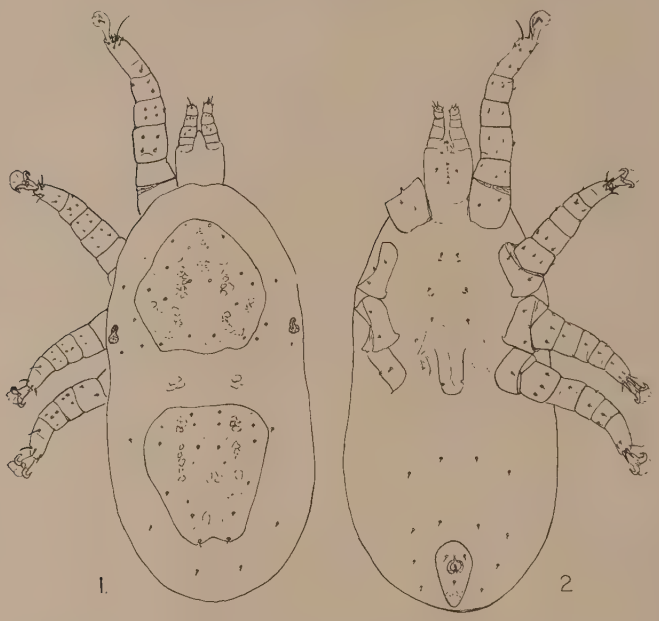


EXPLANATION OF PLATE I

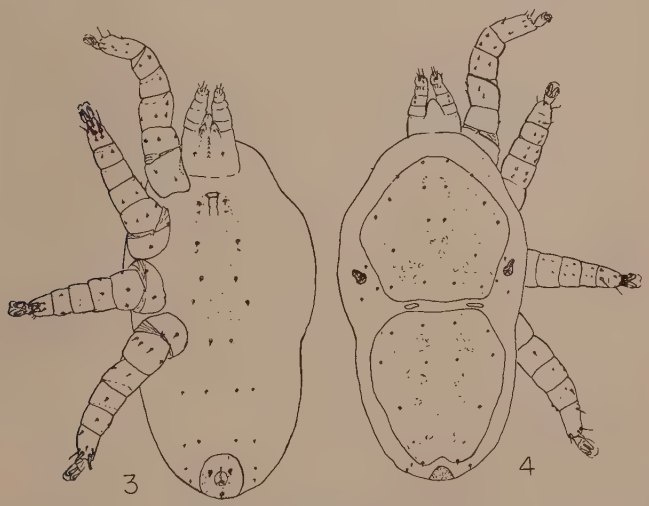
Paraneonyssus icteridius, female. Fig. 1, dorsal view; Fig. 2, ventral view.

Paraneonyssus icteridius Standtmann and Furman, new species

A small, delicate mite characterized primarily by the stout apical spurs on tarsi II, III, and IV.

Female: Idiosoma—610 microns long; 308 microns wide. *Dorsum* (Fig. 1)—Podosomal plate rounded pentagonal with posterior margin almost straight; 188 microns long by 194 microns wide; minutely punctate with approximately 18 to 20 circular pores most of which bear minute setae; surface bearing a cellular pattern as figured. Opisthosomal plate large, measuring 194 microns long by 183 microns wide; widest anteriorly and tapering posteriorly; a pair of short spinules on posterior margin; the posterior margin varies from straight to deeply indented; surface bearing eight pairs of pores with minute setae and markings as on podosomal plate. A pair of small platelets located between the two dorsal plates. Peritreme short, approximately as long as diameter of stigma; located over coxa III. Unarmed cuticula bearing three pairs of short setae near postero-lateral borders of podosomal plate, one posterior to the stigma, two pairs lateral to opisthosomal plate and one pair posterior to it; cuticula finely striated. *Venter* (Fig. 2)—Setae of venter all short, 9 microns or less, and delicate.

Sternal plate with indistinct margins as figured, bearing the first pair of sternal setae and two pairs of pores; second and third pairs of sternal setae located off the plate, and occasionally the first pair of setae may be off the plate also. Pair of metasternal setae present, but no metasternal pores. Genitoventral plate small, with rounded posterior margin extending to level of posterior edge of coxa IV, bearing one pair of setae. Anal plate broadly rounded anteriorly, acuminate posteriorly; adanal pair of setae located anterior to anal opening; post-anal seta present and of same size as adanal setae. Unarmed region of opisthosome bearing two transverse rows of four setae each and two posterior transverse rows of two setae each. Cuticula finely striated. *Legs:* As figured, short, bearing the normal coxal setation; setae of legs in general very short and stout, a few longer setae dorsally, particularly on tarsi. Tarsi II (Fig. 11), III and IV each with two prominent ventral apical spines. All tarsi with pretarsi, caruncles and claws; paired claws of tarsi I delicate and not of typical claw shape compared to those of other legs which are prominent and flaring. *Gnathosoma* (Figs. 7 and 8)—Paired gnathosomal setae very short, delicate; deutosternal groove bearing single column of five denticles, rarely six or seven; two pairs of lateral and one pair of distal hypostomal setae present though much reduced. Epipharynx indistinct. Tectum a simple membranous flap, reaching as far as the middle of palp femur. Forked seta of palpus present (Fig. 10). Chelicerae as figured, narrowly elongate, 74 microns long, distal to basal piece; movable digit three to four microns long; fixed digit slightly smaller (Fig. 8).



EXPLANATION OF PLATE II

Paraneonyssus icteridius, male. Fig. 3, ventral view; Fig. 4. dorsal view.

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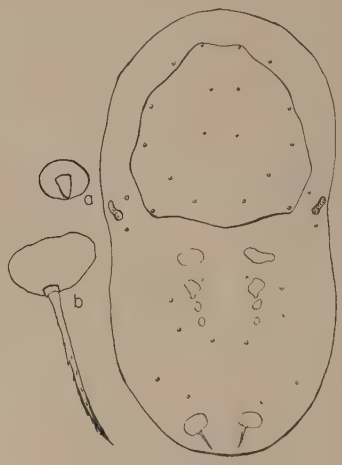

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EXPLANATION OF PLATE III

Paraneonyssus icteridius, nymph. Fig. 5, ventral view; Fig. 6, dorsal view; Fig. 6-a, enlarged dorsal seta; Fig. 6-b, enlarged pygidial platelet and attached seta.

Male: Idiosoma—420 microns long by 216 wide. Irregularly oval with shoulders over coxae II and lateral indentations over coxae IV. *Dorsum* (Fig. 4)—Podosomal and opisthosomal plate structure and shape similar to female; vestigial setae visible in some pores of plates, as figured. Peritreme and unarmed cuticula as in female. Posterior tip of anal plate frequently folded over margin of opisthosome to extend onto dorsal surface, but it may also be entirely ventral. *Venter* (Fig. 3)—All ventral setae minute. Holoventral plate poorly defined, elongate, extending from posterior margin of coxae I to mid-level of coxae IV, bearing male genital opening at anterior margin; three pairs of sternal setae; a pair of pores behind first and second pairs of setae; a fourth pair of setae located lateral to the plate at level of posterior fourth of coxae III. Anal plate as in female. Unarmed region of opisthosome as in female. *Legs*—As figured, similar to those of female, but claws of tarsus I of normal shape. *Gnathosoma*—Similar to female. Forked seta of palpus present. Chelicera (Fig. 9) stouter than in female, with a

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EXPLANATION OF PLATE IV

Paraneonyssus icteridius, Fig. 7, ventral view of gnathosoma of female; Fig. 8, dorsal view of gnathosoma of female showing tectum and chelicera;

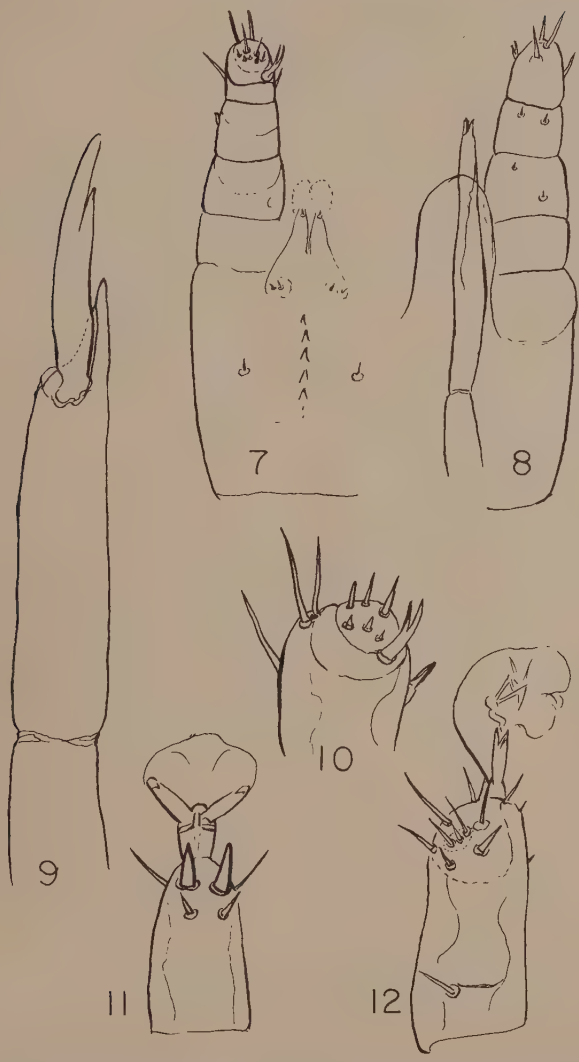

Fig. 9, chelicera of male; Fig. 10, ventral view of left pedipalp, tibia and tarsus of female; Fig. 11, ventral view of tarsus II of female; Fig. 12, dorsolateral view of tarsus I of female.

long movable digit, to which is fused the even longer spermatodactyl, as figured; fixed digit indistinct but appears as a relatively short spur.

Nympha—The nymphal stages of the Rhinonyssidae are very similar so we are not certain which stage we have although it is probably the deutonymph. Length, 430 microns. *Venter* (Fig. 5)—The ventral plate lies between coxae II and III. It is twice as long as broad, has a pair of anterior, marginal setae, a pair of marginal setae mid-laterally, and a pair of postero-lateral setae as figured. Some or all of these setae could very likely be found on the plate on occasional specimens. The metasternal setae are lacking. The anal plate as in the female. The opisthosoma bears six or seven pairs of tiny setae. *Dorsum* (Fig. 6)--The podosomal plate is present and similar to that of the female. The opisthosomal plate is lacking but in its place are two rows of indistinct small platelets. The pygidial area has two platelets each of which bears a prominent, lightly barbed seta. These setae constitute a striking dissimilarity between the nympha and the adults. The male and female both lack them. *Legs*—The tarsal spurs of legs II, III and IV are present although smaller than in the adults. The claws also are smaller. Otherwise the chaetotaxy of the legs is as in the female. *Gnathosoma* —Similar to the female.

Larva—Three of the more than 50 females studied contained hexapod larvae. These were not disssected out. They showed no unusual features.

Holotype female collected in nasal turbinates of the cowbird. *Molothrus ater californicus* Dickey and Van Rossem, at BAKERSFIELD, KERN COUNTY, CALIFORNIA; allotype male same data. Both are deposited in the U.S. National Museum (Type No. 2228), along with several paratypes. Selected as paratypes are 15 females, 5 males and 7 nymphs from the same host specimens and locality as the holotype and allotype, all collected by G. Hutson, ornithologist of the encephalitis research unit of the Hooper Foundation for Medical Research, under the supervision of W. C. Reeves. Other specimens included as paratypes are 35 females, 3 males, 2 nymphs and 1 larva collected from *Molothrus ater* in Texas, as follows: Caldwell County, June 9, 1950 (5 females); Clay County, April 13, 1952, R. W. Mitchell, collector (19 females, 2 males, 2 nymphs); Leon County, March 1, 1950, E. O. Hunt, collector (1 female, 1 larva); Lubbock County, November 4, 1950 (4 females) and November 18, 1952 (6 females, 1 male). These 41 mites were taken from 5 of 7 birds examined.

Other birds found infected were one eastern meadow lark, *Sturnella magna* (Leon County, Texas, E. O. Hunt, collector); one yellow-headed blackbird, *Xanthocephalus xanthocephalus* (Kern County, California); 11 common red-wings, *Agelaius phoeniceus* (two from Kern County, California, nine from Lub-

bock County, Texas); four tri-colored red-wings, *Agelaius tricolor*, (Kern County, California); one Brewer's blackbird, *Euphagus cyanocephalus*, (Lubbock County, Texas); one bronze grackle, *Quiscalus quiscula*, (Pampa, Texas); one western tanager, *Piranga ludoviciana* (Kern County, California).

The specific name was chosen because of the common occurrence of the mite in birds of the family Icteridae. The only non-icterid host is the western tanager, but it is very closely related to the Icteridae.

It does not seem strange that cowbirds should have a species of nasal mites similar to those of other Icteridae, since they are frequently raised by icterid foster parents. It is interesting to note, however, that commonly cowbirds do not seem to support nasal mites of species found in non-icterid foster parents. The implication here is that host specificity of these nasal mites is operative even in the face of ample opportunities for cross transmission of parasites.

It should be noted that the mites from the meadow lark *(Sturnella)* averaged 720 microns long, considerably larger than those from the other birds. Also some mites from the redwing blackbird had six deutosternal teeth and one from the bronze grackle had seven deutosternal teeth.

The new species here described may be distinguished from the other three species of this genus by its strong claw-like setae on tarsi II, III, and IV. *Paraneonyssus hirsti* (Castro and Pereira) lacks these entirely. *Paraneonyssus enriettii* (Castro and Pereira) is said to have *one* apical claw-like seta on tarsi II–IV and also has a smaller opisthosomal plate. *Paraneonyssus travassosfilhoi* (Castro and Pereira) has four prominent setae on the podosomal plate and four on the opisthosomal plate.

REFERENCES

BERLESE, A. and TROUESSART, E. L.
1889. Diagnosis d'acariens nouveaux ou peu connus. Bull. Biblioth. Scient. Ouest. 2 an. 2 pt. (9):126–130. (Orig. not seen.)

CASTRO, M. P. DE
1948. "Restruturacao Generica Da Familia 'Rhinonyssidae Vitzthum, 1935' (Acari Mesostigmata: Gamasides) E Descricao de Algumas Especies Novas." *Arquivos do Instituto Biologico 18*(13):253–284. Sao Paulo, Brazil.

CASTRO, M. P. DE and PEREIRA, C.
1949. "Revisao de Subfamilia 'Ptilonyssinae Castro, 1948' (Acari Mesostigmata: Rhinonyssidae Vitzthum) com a Descricao de Algumas Especies Novas." *Arquivos do Instituto Biologico. 19*(15):217–235. Sao Paulo, Brazil.

RECENT LITERATURE

TAXONOMIC APPRAISAL AND OCCURRENCE OF FLEAS AT THE HASTINGS RESERVATION IN CENTRAL CALIFORNIA. By Jean M. Linsdale and Betty S. Davis. Univ. Calif. Publ. in Zoology, Vol. 54, No. 5. pp. 293–370, incl. pls. 11–22; 27 text figs. [charts]. University of California Press, Berkeley and Los Angeles; March 19, 1956. Price $1.50.

A report on 27 species of fleas taken from 34 species of mammals (24,759 fleas from 2,459 mammals), from 1,600 acres of protected land.

The following three items are from the series *University of California Publications in Entomology*.

THE FRANKLINIELLA OCCIDENTALIS (PERGANDE) COMPLEX IN CALIFORNIA (Thysanoptera: Thripidae). By Douglas E. Bryan and Ray F. Smith. Vol. 10, No. 6, pp. 359–410, 10 text figs. [charts]; March 16, 1956. Price 75 cents.

A study of variability, based in part on reared specimens of known inheritance, and giving a foundation for the evaluation of other species in the genus.

THE LARVAL TROMBICULID MITES OF CALIFORNIA (Acarina: Trombiculidae). By Douglas J. Gould. Vol. 11, No. 1, pp. 1–116, incl. pls. 1–26; March 28, 1956. Price $2.00.

This is a study of the systematics, distribution, and hosts of larval trombiculids in California. There are keys to the subfamilies, genera, subgenera, and species. New species are described in *Leeuwenhoekia* (2), *Trombicula* (4), and *Euschöngastia* (9). There is a classified list of hosts on pp. 73–78.

A REVISION OF THE GENUS PSELAPTRICHUS BRENDEL (Coleoptera: Pselaphidae). By Robert O. Schuster and Gordon A. Marsh. Vol. 11, No. 2, pp. 117–158, 74 text figs., 5 maps. May 7, 1956. Price $1.00.

This study is based on more than 3,000 specimens from about 100 localities "All available biological data are included, variation in three populations is analyzed, and distributional information is summarized for the genus." There is a key to the genera of the tribe Bythinini, and one to males of the species of *Pselaptrichus*. Twenty-two of the 30 known species are described as new; only one is over 2 mm. long! Accurate identifications require slide mounts of males, with the genitalia extruded or dissected out. —HUGH B. LEECH, *California Academy of Sciences*.

TAXONOMIC CHANGES IN THE AGELENIDAE
(Arachnida)

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A number of errors in the literature, involving new synonomy and other needs for nomenclatorial changes in the family Agelenidae, have come to my attention during the past few years. Since these occur in several genera, it was deemed advisable to present them in one general paper and not to wait until the various genera were revised. The errors in a recent paper by E. Schenkel (1950) on "Spinnentiere aus dem westlichen Nordamerika" seemingly were caused by a lack of essential literature. The author states in his introduction, "Da mir die Literatur uber nordamerikanische Spinnen nur sehr unvollstandig zuganglich ist."

AGELENINAE

A comparison of the *Tegenaria* of the Western Hemisphere with those of Europe has shown that all of our species are synonymous with European species with one possible exception, *T. flexuosa* F. O. Pickard-Cambridge of Mexico, which probably will eventually prove to be synonymous. Recently an additional species of *Tegenaria* was noted from Mexico in the American Museum of Natural History at New York City, New York by Dr. W. J. Gertsch. This specimen, a single male from Taxco, Guerrero in Mexico, collected by Leo Isaacs in October, 1945 is as yet unidentified. This specimen is very similar to *T. longimana* Simon from "Rossia merid. Batoum (Radde)" in the Caucasus Mountains at the east end of the Black Sea. It differs in part by its smaller size (5.5 to 11 millimeters) and the length of the cymbium which is three and one-half times as long as the length of the bulb compared to two times as long in *T. longimana* Simon. Only those doubtful species of *Tegenaria* remain unsynonymized which were insufficiently described, for which types are not known, and which have never been subsequently collected. They include: *T. arboricole* Walckenaer (Georgia), *T. flavens* Hentz (Alabama), *T. nemorensis* Walckenaer (Georgia), and *T. insularis* Walckenaer (Cuba).

These *Tegenaria* now known in the Western Hemisphere are

[1] The author is indebted to Dr. W. J. Gertsch of the American Museum of Natural History and to Dr. R. L. Usinger of the University of California at Berkeley, both of whom have read this paper and offered many helpful suggestions and criticisms.

probably all introductions from Europe. One of the most common of the species, *T. domestica* (Clerck) is known to have followed the dispersal of civilized man and is now established in temperate and tropical areas around the world. The other species of *Tegenaria* have similar habits, all being found in, on, or near human dwellings, and are especially good subjects for introduction in commerce.

TEGENARIA ATRICA C. L. Koch

Tegenaria atrica C. L. Koch 1843:105, figure 825.

T. gigantea Chamberlin and Ivie 1935:31, figure 106 (male), *new synonomy.*

T. gigantea, Exline 1936:21, figure 3 (male).

T. gigantea, Exline 1938:25, figures 30–31 (male).

T. gigantea, Roth 1952:286, figures 3–5 (female).

Present distribution: Southern half of Vancouver Island, British Columbia, Canada and most of Europe east to 31° east longitude from Spain to Denmark and Sweden.

TEGENARIA LARVA Simon

Tegenaria larva Simon 1875:86–87, plate 5, figure 8 (male).

Tegenaria praegrandis Fox 1937:176–177, figure 3 (female), *new synonymy.*

T. praegrandis Fox was based upon a specimen which as indicated by Roth (1952:287), was probably mislabeled and was not collected in the United States.

Present distribution: Southwestern Europe including British Isles, Germany, France, Switzerland, Czechoslovakia. Spain and Portugal.

TEGENARIA PAGANA C. L. Koch

Tegenaria pagana C. L. Koch 1841:31, figures 612–613.

T. obscura Banks 1898:230–231, figure 26 (female), *new synonymy.* (Preoccupied by *T. obscura* Koch and Berendt 1854:46–47, figure 36, an amber fossil spider.)

T. antrias Crosby 1926:2, figure 3 (female), *new synonymy.*

T. antrias Roth 1952:284.

In a paper on *Tegenaria* in 1952 I indicated that *T. obscura* Banks was "close to and probably identical with *T. antrias* Crosby." Additional study and specimens from southern California have convinced me that both species are identical.

Present distribution: Southern United States from Alabama to California and northern Mexico; Europe, south from Germany and east to Asia Minor, northern Africa and west to the Azores.

AGELENOPSIS APERTA (Gertsch)

Agelenopsis gertschi Schenkel 1950:79–81, figure 28 (female), *new synonymy.*

Females taken from Mt. Diablo, in the same county as the type of *A. gertschi*, agree with the description of the latter species and are undoubtedly *A. aperta* (Gertsch).

CALILENA RESTRICTA DIXIANA Chamberlin and Ivie

Calilena multiformis dixiana Chamberlin and Ivie 1941:608, figure 52 (female).

This variety was inadvertently called "*multiformis dixiana*" in the original description. However, there is no species named *multiformis*, and according to Dr. R. V. Chamberlin (*In litteris*, December 27, 1949) *dixiana* is a variety of *C. restricta* Chamberlin and Ivie.

CALILENA UMATILLA Chamberlin and Ivie

Calilena umatila Chamberlin and Ivie 1941:609, figures 54 (female), 70–71 (male).

According to Dr. Chamberlin (*in litt.*, December 27, 1949) the name *umatilla* was mispelled in the original description. It was used correctly on page 610 of the same paper.

HOLOLENA FURCATA Chamberlin and Gertsch

Agelenopsis furcata, Schenkel 1950:86.

MELPOMENE PENETRALIS (F.O.P.C.), new combination

Agelenopsis penetralis F. O. Pickard-Cambridge, 1902:337, figure 8 (♀).

RUALENA BALBOAE Schenkel, new combination.

Agelenopsis balboae Schenkel, 1950:82–84, figure 30 (female).

CALYMMARIA CALIFORNICA (Banks)

Tegenaria californica, Schenkel 1950:90.

BLABOMMA CALIFORNICA (Simon), new combination

Chorizomma californicum Simon 1895:136–137, figure (male).

C. californicum Simon 1898:268, figures 257, 264 (male).

Blabomma grandis Chamberlin and Ivie 1937:219–220, figures 35–36 (male), 34, 37–39 (female), *new synonymy.*

B. grandis, Exline 1938:19–20, figures 6, 23-24 (female).

B. grande, Roewer 1944:9.

Chorizomma californicum, Roewer 1944:11.

Yorima californica of Chamberlin and Ivie is not Simon's species but is a new one recently named *Yorima angelica* Roth. The misidentification was probably due to the fact that Simon described and illustrated only six eyes, apparently overlooking the minute anterior median eyes.

BLABOMMA FOXI Chamberlin and Ivie

Blabomma guttata Chamberlin and Ivie 1937:220–221, figures 41–42 (in part, male only).

Blabomma guttata Chamberlin and Ivie was based upon a female holotype and a male allotype from Berkeley, California. The latter specimen was found to be a misidentification after a series of more than 40 specimens of both sexes of *B. guttata* Chamberlin and Ivie were collected one mile west of Orinda in Contra Costa County, California and a small series of both sexes of *B. foxi* Chamberlin and Ivie were taken in the Berkeley Hills, California. In addition, males and females of a third species near *B. foxi* Chamberlin and Ivie confirm this placement of sexes.

CYBAEINAE

CYBAEUS ADENES Chamberlin and Ivie

Cybaeus adenes Chamberlin and Ivie 1932:24–25, figure 59 (female).
C. grizzlyi Schenkel 1950:86–88, figure 32 (male), *new synonymy.*
C. adenoides Schenkel 1950:88–90, figure 33 (female), *new synonymy.*

A large series of male and female *C. adenes* Chamberlin and Ivie have been taken by the author from Marin County and the Berkeley Hills in California which includes the three type localities. They all agree with one another and with Schenkel's species.

CYBAEUS BLASBES Chamberlin and Ivie

Cybaeus blasbes Chamberlin and Ivie, 1932:22, figure 55.

Type locality should read North Fork (not Northfolk). California, Madera County.

CYBAEUS CRIBELLOIDES Chamberlin and Ivie

Cybaeus cribelloides Chamberlin and Ivie 1932:26, figure 62 (female).
C. consocius, Gertsch and Ivie 1936:22, figure 48 (male).
C. cribelloides Chamberlin and Ivie 1942:18, figures 45–46 (male).

Genus CYBAEINA Chamberlin and Ivie, 1932

In a recent paper by Roth (1952) on CYBAEINA, several errors occurred: page 195 under the heading "*Cybaenia confusa* Chamberlin and Ivie" the line should read "Figures 1, 3, 6"; page 197 under the heading "*Cybaeina sequoia* Roth, new species" the line should read "Figures 2, 4, 5"; and the measurements on page 201 are for females rather than males as indicated.

LITERATURE CITED*

BANKS, N.
1898. Arachnida from Baja California and other parts of Mexico. Proc. Calif. Acad. Sci. (Zoology), series 3, 1(7):205–308.

* Not seen by author.

CHAMBERLIN, R. V. AND WILTON IVIE

1932. North American spiders of the genera *Cybaeus* and *Cybaeina*. Bull. Univ. Utah, 23(2):1–43.

1935. Miscellaneous new American spiders. Bull. Univ. Utah, 26(4): 1–79.

1937. New spiders of the family Agelenidae from western North America. Ann. Ent. Soc. Amer., 30(2):211–241.

1941. North American Agelenidae of the genera *Agelenopsis*, *Calilena*, *Ritalena* and *Tortolena*. Ann. Ent. Soc. Amer., 34(3):585–628.

1942. A hundred new species of American spiders. Bull. Univ. Utah, 32(13):1–117.

CROSBY, C. R.

1926. Some arachnids from the Carlsbad Cave of New Mexico. Proc. Ent. Soc. Wash., 28(1):1–5.

EXLINE, H.

1936. New and little known species of *Tegenaria* (Araneida: Agelenidae). Psyche 43(1):21–26.

1938. The Araneida of Washington: Agelenidae and Hahniidae. Univ. Wash. Pub. Biol., 9(1):1–44.

FOX, I.

1937. Notes on North American Agelenid spiders. Canad. Ent., 69:174–177.

GERTSCH, W. J. AND WILTON IVIE

1936. Descriptions of New American spiders. Amer. Mus. Novitates, 858:1–25.

KOCH, C. L.

1841. *Die Arachniden, Nurnberg 8:1–131.

1843. *Die Arachniden, Nurnberg 10:1–142.

KOCH, C. L. AND G. C. BERENDT

1854. Die im Bernstein befindlichen Crustaceen. Myriapoden. Arachniden und Apteren der Vorwelt (pages 19–94) *in* Berent, G. C., Die im Berstein befindlichen Organischen Reste de Vorwelt, Berlin 1(2):1–124.

PICKARD-CAMBRIDGE, F. O.

1902. Biologia Centrali-Americana. Zoologia. London 2:1–C10.

ROEWER, C. FR.

1944. Katalog de Araneae Bremen, 2:1–160.

ROTH, VINCENT D.

1952. Notes and a new species in *Cybaeina* (Arachnida: Agelenidae). Pan-Pac. Ent., 42(9):195-201.

1952. A review of the genus *Tegenaria* in North America (Arachnida: Agelenidae). Jour. Wash. Acad. Sci., 42(9):283-288.

SCHENKEL, E.

1950. Spinnentiere aus dem westlichen Nordamerika. Part I. Verhand. Natur. Ges. Basel, 61:28–92.

SIMON, E.
1875. Les Arachnides de France. Paris. 2:1–350.
1895. Descriptions de quelques Arachnides de Basse-Californie faisant partie de collections du Dr. Geo. Marx. Bull. Soc. Ent. France, 20:134–137.
1898. Histoire naturelle de Araignees. 2(2):193–380.

SCOLIA PUPAE COLLECTED FROM THE LODGES OF WOOD-RATS IN ARIZONA

(Hymenoptera: Scoliidae)

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On April 14, 1952 the author, assisted by K. Y. Arakawa, was collecting triatominae from the lodges of *Neotoma* 20 miles south of Mesa, Pinal County, Arizona. In this particular habitat the wood-rats build their nests under and between large boulders. Two hymenopterous pupae were collected from the nest material raked out from under a large overhanging boulder. The specimens were reared out in the laboratory and pinned with the pupal cases. P. D. Hurd has identified the specimens as *Scolia otomita* Saussure, 1858. Coleopterous larvae are commonly found in the large amount of debris which makes up a wood-rat lodge.

The limited information available indicates that these Scoliidae are parasitic on beetles of the family Scarabaeidae. This is the first association of *Scolia otomita* with its breeding site. The literature on the biology of Scoliidae has been reviewed by Hurd (1952). It is suggested that collectors interested in the hosts of *Scolia* examine coleopterous larvae in the debris of wood-rat lodges.

LITERATURE CITED

HURD, PAUL D.
1952. The Scoliidae of California. Bull. Calif. Insect Surv., 1(6):141–147.

NOTES ON THE BIOLOGY OF PLEOCOMA DUBITALIS DUBITALIS DAVIS[1]

(Coleoptera: Scarabaeidae)

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Pleocoma dubitalis dubitalis Davis is a common, widely distributed rain beetle occurring in the northwestern part of Oregon. Linsley (1938) in his distribution summary lists the subspecies from Washington County (Dilley, Forest Grove); Marion County (Salem); and Benton County (Corvallis). Linsley (1941) also records it from Yamhill County (McMinnville).

In general, this subspecies occurs in many localities on the slopes of the east side of the Coastal Range, a few isolated localities in the Willamette Valley, and to a limited extent on the west slopes of the Cascade Mountains southeast of Salem. In the Coastal Range, colonies have been found from about five miles southwest of Philomath, Oregon (Benton County) to the vicinity of Forest Grove (Washington County). The subspecies has not been found on the west side of the Coastal Range. In the Willamette Valley, colonies occur in the vicinities of Salem, Scio and Sublimity.

Pleocoma dubitalis dubitalis is found associated with douglas fir, usually in old growth timber. Coast Range colonies are at elevations of 600 to 1200 feet above sea level. Colonies in the Willamette Valley with which we are familiar occur at elevations between 300 and 400 feet.

Adult activity. Male flight usually occurs during October and November after fairly heavy fall rains. Flight occurs in the rain or when the air is saturated with moisture. Flight is heaviest during the early morning hours, shortly after dawn, but males have also been observed flying in small numbers at various times during the day. (10:00–11:40 a.m., 2:05 p.m.)

In 1954 flight began October 16 (Forest Grove) and continued, when conditions were favorable, through the second week in November. The largest flight observed took place on November 5 when 75 males were taken between 6:53 and 7:40 a.m. in MacDonald Forest, five miles northwest of Corvallis. During this time a gentle rain was falling and the temperature was 51° F.

Males in flight skim along about 4 to 12 inches above the ground. They can be knocked down with the hand but are best

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taken by net since when disturbed they fly erratically and often escape by soaring 20 or more feet into the air. Their widespread distribution throughout the woods during flight indicates that the female burrows are not confined to paths and roadways as is sometimes assumed.

Eleven trips were made between October 12 and November 19, 1954 to observe the activity of *Pleocoma dubitalis dubitalis* and several hundred burrows were examined. Observations were made at six different sites in MacDonald Forest and at one site southwest of Philomath.

A few female burrows were found along woodland trails on October 21, 1954, one day after flight began, but none of the females (4) had yet been found by males. Unmated females are usually found from two to six inches deep in the soil in a vertical position, with their heads pointed straight down. In most cases the female burrow is open to a depth of one or two inches but there is always pulverized soil above the female, through which the male must dig. Burrows, below the females, are almost always packed with pulverized soil.

Between October 22 and November 7, 1954, nine burrows were found in which males were digging down to females. Often two or three males were attracted to the same burrow. On October 24 and again on November 9, after most of the flight was over, several females were observed, in burrows, which had apparently not been found by males.

In 1955, the earliest record of flight was October 3 when Kenneth Fender reported seeing five males in flight at McMinnville, Oregon. At MacDonald Forest, northwest of Corvallis, the flight period began shortly before October 8 and continued through November 4.

Oviposition. Egg laying habits have been observed both in the field and in a temperature cabinet simulating field conditions. It was found that *Pleocoma dubitalis dubitalis* has egg laying habits similar to those of *Pleocoma behrensi* Le Conte as observed by J. W. MacSwain of the University of California (personal communication) and similar to those of *Pleocoma crinita* Linsley (Ritcher and Olney, 1953).

Soon after mating in October and November of 1954, females of *Pleocoma dubitalis dubitalis* burrowed down vertically in the soil. In 1955, in a temperature cabinet which simulated soil temper-

atures, these same females began laying eggs in late May or early June. Egg laying was still in progress on June 18, 1955.

On July 23, 1954, a live female with her "nest" of eggs was dug from the soil beneath a woodland path in MacDonald Forest. This female was 11.5 inches deep, in a horizontal position, and in the soil beneath her, between 12 and 17.5 inches in depth, were 50 eggs. These eggs had been laid individually, beginning at the bottom of the burrow, spiral fashion, with a vertical core of pulverized soil.

Eggs are dull white in color and ellipsoidal in shape. As they become older they increase in size and become almost spherical. Ten eggs from one to three days old ranged from 3.9 to 5.1 mm. in length and 2.7 to 3.5 mm. in width. The chorion is so tough that eggs can be dropped on a wooden floor without apparent injury.

Eggs found in 1954 were kept at a constant temperature of 60° F. which approximated that of the soil where they were found. Hatching (24 eggs) occurred from August 28 to September 8.

In 1955 seven pairs of beetles, obtained during the 1954 flight, were used for oviposition studies in a temperature cabinet simulating soil temperatures. Three females left undisturbed in quart mason jars of packed sifted soil laid 59, 47 and 14 eggs respectively (a fourth died early in the spring). Three females moved to 3-ounce salve boxes and disturbed frequently to get oviposition records, laid 10, 7 and 8 eggs respectively. Total egg capacity for five females was 59, 61, 51, 33, and 53 eggs.

Eggs were laid from May 25 through June 18 in the temperature cabinet. Eggs hatched between September 1 and September 24 at a temperature ranging between 56 and 58° F. The length of the egg stage for 13 eggs of known age ranged from 83 to 95 days.

Habits of larvae. Nothing at all is known about the feeding habits of *Pleocoma dubitalis dubitalis* larvae even though the species is found associated with douglas fir. Larvae which appear to be full grown, or nearly so, are frequently encountered in forest soils at rather shallow depths (2.5 to 15.5 inches deep). One small larva was found at a depth of 43 inches.

Pupation. So far, four pupation records have been secured, all from MacDonald Forest about five miles northwest of Corvallis, at a site having an elevation of approximately 1100 feet. On October

1, 1952, the writers found an adult male in a pupal cell, beneath a woodland path, at a depth of five inches. On July 22, 1954, three pupae, two males and one female, were found in the same area at depths of 7, 9.5, and 7.5 inches respectively. One male pupa became an adult September 5, 1954.

LITERATURE CITED

LINSLEY, E. G.
1938. Notes on habits, distribution, and status of some species of Pleocoma. (Coleoptera, Scarabaeidae.) Pan-Pacific Ent. 14 (2) 49–58 and (3):97–104.

LINSLEY, E. G.
1941. Additional observations and descriptions of some species of Pleocoma (Coleoptera, Scarabaeidae.) Pan-Pacific Ent. 14 (2) 145–152.

RITCHER, P. O. and VERNON OLNEY
1953. White grubs as apple tree pests in the Hood River Valley. Oregon State Hort. Soc. Rept. 45:41–42.

A BETHYLID PARASITE OF CONE BEETLES

(Hymenoptera: Bethylidae)

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The only record of a Bethylid parasite on Scolytidae, according to Chamberlin (1939) is a report by Hopkins (1899) that the genus *Pityophthorus*, family Scolytidae, was parasitized by *Cephalonomia hyalinipennis* Ashm.

During a study of the Scolytidae infesting the pine cones of California, eleven adults of *Cephalonomia utahensis* Brues[2] were collected from sugar pine cones infested with *Conophthorus lambertianae* Hopk. and ponderosa pine cones infested with *Conophthorus ponderosae* Hopk. Upon dissection of the cones, cocoons of the wasp were found on cone bracts where *Conophthorus* had been working and the head capsules of *Conophthorus* larvae were enmeshed in the fibers of the cocoons. In one instance a pupa of *Cephalonomia utahensis* was found in a cocoon, fig. 1. The number of cocoons found in association with individual

[1] Studies of the cone and seed insect problems in the California pine region made possible by a grant from the Gilbert M. Walker Trust.

[2] Determined by H. E. Evans, Cornell University, Ithaca, New York.

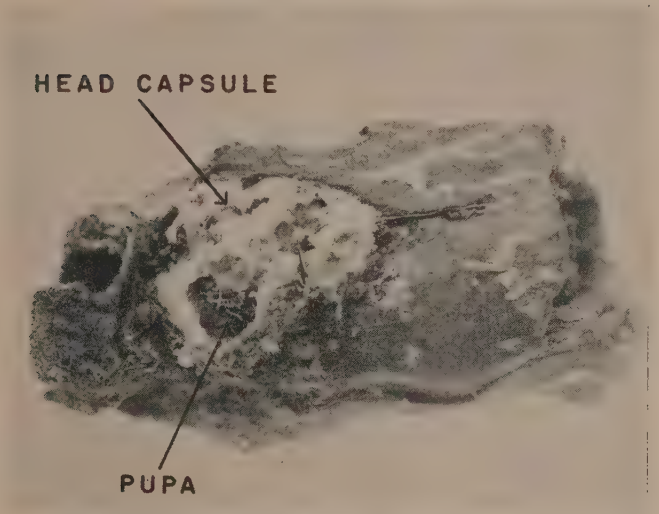

Fig. 1. Cocoons and pupa of *Cephalonomia utahensis Brues* in association with head capsule of *Conophthorus lambertianae* Hopk.

host head capsules ranged from 1 to 8. A dead *C. lambertianae* larva was found in a cone and there were six larvae attached externally to it. The parasite larvae were erratically arranged on the host; two on the thorax and the other four on the abdomen. It was assumed that these were the larvae of *C. utahensis*, as in other reported cases of Bethylid parasitism the larvae were ectoparasitic on the hosts.

The sugar pine cones containing *C. utahensis* were collected from Bucks Lake, Plumas County and Speckerman Mountain, Madera County. The ponderosa pine cones containing *C. utahensis* were collected from Trinity Center, Trinity County, Viola, Shasta County, Middletown, Lake County, and Figeroa Mountain, Santa Barbara County. All these points of collection are in California.

LITERATURE CITED

CHAMBERLIN, W. J.
1939. The bark and timber beetles of North America. OSC Coop. Assoc., Corvallis, Oregon.

HOPKINS, A. D.
1899. Preliminary report on the insect enemies of the forests of the Northwest. U.S.D.A. Div. Ent. Bul. 21, N.S.

ZOOLOGICAL NOMENCLATURE: NOTICE OF PROPOSED USE OF THE PLENARY POWERS IN CERTAIN CASES FOR THE AVOIDANCE OF CONFUSION AND THE VALIDATION OF CURRENT NOMENCLATORIAL PRACTICE (A.[n.s.]30).

Notice is hereby given that the possible use by the International Commission on Zoological Nomenclature of its Plenary Powers is involved in applications relating to the under-mentioned names included in Part 6 and Double-Part 7/8 of Volume 12 of the *Bulletin of Zoological Nomenclature*, both of which Parts will be published on 24th August 1956:

(a) Applications in Part 6 of Volume 12

1. *Campsicnemus* Haliday, 1851, validation of (Class Insecta, Order Diptera) (Z.N.[S]1080).

Any specialist who may desire to comment on the foregoing application is invited to do so in writing to the Secretary to the International Commission (Address: 28 Park Village East, Regent's Park, London, N. W. 1, England) as soon as possible. Every such comment should be clearly marked with the Commission's File Number as given in the present Notice. FRANCIS HEMMING, Secretary to the International Commission on Zoological Nomenclature.

SOME SOUTH AMERICAN APHIDS FROM PARAGUAY

(Homoptera: Aphidae)

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Aphids collected at the Experiment Station, Chaco, Paraguay, February 22 to September 5, 1955 by J. L. Nickel.

1. Brown citrus aphid, *Aphis citricidus* Kirkaldy; on Kumquat, Caaupe, Feb. 22, 1956, six small apterous specimens.
2. Melon or cotton aphid, *Aphis gossypii* Glover, on cotton, Dec. 19, 1955, ten specimens—aptera and alates.
3. Cowpea aphid, *Aphis medicaginis* KOCH, on *Sesbania*, September 26, 1955. Five small immature specimens.
4. Oleander aphid, *Cerosipha nerii* (B.d.F.) on oleander, August 28, 1955. One alate, five immature and apterae.
5. Corn or maize aphid, *Rhopalosiphum maidis* (Fitch), on Sudan grass, September 26, 1955. Two slides, 14 apterae.
6. Turnip aphid, *Rhopalosiphum pseudobrassicae* (Davis), on turnip, September 26, 1955. Two slides, 10 apterae and two alates.
7. Paraguayan wild lettuce aphid, *Macrosphum nickeli* n. sp. A large dark species.

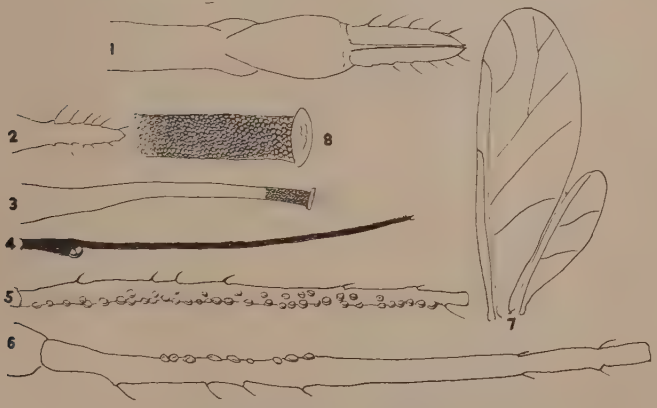
Macrosiphum nickeli Essig, new species

The Paraguayian Wild Lettuce Aphid

Type: EXPERIMENT STATION, CHACO, PARAGUAY, Alate parthenogenetic female: Appears to be dark reddish-brown with black or very dark markings on the head, thorax and appendages. The body spines are short and variously enlarged apically. The antennae are long and slender with 10 to 13 or more sensoria on segment III of the aptera and 40 to 43 on the alatae. The cornicles are rather long and slender being also straight or outwardly curved and with fine reticulations on the apical 1/5th. The length slightly exceeds that of antennal segment III. The rostrum is long and slender and extends slightly beyond the hind coxae. Segment III is considerably narrower than IV; both bear more hairs than usual.

The Apterae are much the same as the alatae in general aspects. The antennae have 11 to 23 sensoria on segment III and the reticulations on the cornicles are more pronounced than those of the alatae and are often curved. The body hairs are pointed or slightly capitate and the integument densely lined with fine striae and bears a considerable number of short blunt and pointed setae and hairs. The rostrum is relatively slender and short and extends just beyond the second coxae.

The types are in the collection of the author.



EXPLANATION OF FIGURES

Fig. 1. The Paraguayan wild lettuce aphid, Macrosiphum nickeli Essig. 1, rostrum; 2, cauda; 3, cornicle and enlarged apical portion; 4, terminal antennal segment; 5, antennal segment III of the alate showing sensoria; 6, same for that segment of the apterae; 7, wings; 8, the apical reticulated portion of the antennae. All greatly enlarged.

A NEW RECORD OF THE TICK HAEMAPHYSALIS CHORDEILIS (PACKARD) IN CALIFORNIA

STANLEY J. CARPENTER[1]

While collecting ticks with a drag cloth at Fort Barry, California on January 9, 1952, a single male specimen of *Haemaphysalis chordeilis* (Packard) was captured. The specimen was identified by Dr. Glen M. Kohls of the Rocky Mountain Laboratory, U.S. Public Health Service, Hamilton, Montana. It appears to be a new record for the Pacific Coast states.

The known distribution of *Haemaphysalis chordeilis*, as given by Cooley (1946)[2], includes the eastern and southern United States, west to Texas and Montana and southern Canada, west to British Columbia. The preferred hosts are said to be ground birds but it is occasionally found on mammals including man.

The above collection was made on a hill at Fort Barry at an elevation of approximately 275 feet, overlooking the Golden Gate. The predominant vegetation of the area consists of the grass, *Elymus triticoides* Buckl., and the shrub *Baccharis pilularis* DC. The collection was made between 9:00 and 11:00 a.m. following near freezing night temperature. The day was lightly overcast, allowing intermittent sunshine.

[1] Colonel, MSC, Formerly Chief Entomology Branch, Sixth Army Medical Laboratory, Fort Baker, California.

[2] Cooley, R. A. 1946. The Genus *Boophilus*, *Rhipicephalus* and *Haemaphysalis* (Ixodidae) of the New World. Bul. 187, National Institute of Health, U. S. Public Health Service, 54 pp.

BOOK NOTICE

AQUATIC INSECTS OF CALIFORNIA with keys to North American genera and California species—Edited by ROBERT L. USINGER.

This field manual and text provides a general introduction to aquatic entomology and detailed treatments of the biology and classification of each group of aquatic insects. Heretofore, detailed information on aquatic insects has been scattered through periodicals; this volume offers the first opportunity for students of entomology, wildlife, and related fields to become easily acquainted with contemporary work in this area.

The introduction, written from the ecological point of view, presents the basic concepts of limnology as they apply to insects; the various aquatic habitats of California are described and original classifications are proposed for the streams and lakes of the state. The introduction also deals with the applied aspects of aquatic entomology as they affect mosquito control, irrigation, pollution, pond and game fish culture, and stream and lake management.

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